

STANDARD LEVEL - OPIMINT BRANCH (MSE)
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INVENTORY OF SCIENTIFIC ACTIVITY

1975-76

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1976



Ontario

Ministry
of the
Environment

The Honourable
George A. Kerr, Q.C.,
Minister

Everett Biggs,
Deputy Minister

TD
178-7057
IS8
1976

MINISTRY OF THE ENVIRONMENT

INVENTORY OF SCIENTIFIC ACTIVITY

1975-76

NOVEMBER 9, 1976

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ONTARIO MINISTRY OF THE ENVIRONMENT

INVENTORY OF SCIENTIFIC ACTIVITY

INTRODUCTION

This report has been prepared in response to the request of the Provincial Secretary, D.R. Irvine, on October 8, 1976, and provides an inventory of Scientific Activity based on the 1975/76 budget year. The expenditures are grouped under three headings - Research, Testing and Related Scientific Activity. The report also provides information on staffing and details on the research programmes, particularly contracts and grants as well as on the researchers.

EXPENDITURES

The details on Ministry expenditures in researching, testing and related scientific activity are shown in Table A.

The shared cost portion of our Scientific Activities requires formal liaison between this Ministry and the Federal Government. The principal vehicles for this activity are the boards and committees of the International Joint Commission and those set up under the Canada/Ontario Agreement on Great Lakes Water Quality. The Federal share of these shared cost programmes is included at the bottom of the table.

STAFFING

In Table B, details are provided on the level of training of the scientific and professional staff in research, testing and research administration.

RESEARCH PROJECTS OR PROGRAMMES

In-House

Details on the Ministry's In-House research programmes and projects, as well as information on staff qualifications, age and years of service, are provided in Appendix A.

Contracts

In Appendix B, we have included all details on our contracts. Included is a breakdown of expenditures by Branches and detailed information on each contract including subject, contractor and value.

Grants

Information on the Ministry grant programme is contained in Appendix C. We have included details on each grant including grantee, subject and value.

TESTING

- (a) The laboratories provide an analytical service for the detection, identification and quantitation of trace amounts of organic and inorganic substances in water, soil and air environmental samples.
- (b) Major Clients - MOE branches, Ministry of Natural Resources, Municipalities and other Government agencies.
- (c) Clients are not charged fees.
- (d) The Ministry has a large, modern central laboratory located in Toronto and regional laboratories in Kingston, London and Thunder Bay. Several mobile laboratory units are operated to provide on-the-spot microbiological and/or chemical analyses. The laboratories are equipped with modern analytical instruments to provide the capability for volumetric and gravimetric analysis, for visual, ultraviolet, infrared, atomic absorption and fluoro spectrophotometry, and for measurements of a series of physical and microbiological parameters. The central laboratory is equipped with X-ray fluorescence

and diffraction, emission spectrograph, mass spectrometer and two electron microscopes which will provide a multi-elemental and diagnostic capability for the Ministry.

MINISTRY OF THE ENVIRONMENT
INVENTORY OF SCIENTIFIC ACTIVITIES
EXPENDITURES 1975/76 (\$,000'S)
Table A

Research and Development

| | | |
|----------------------|----------------|----------------|
| In House R & D | 1,919.7 | |
| Contract R & D | 515.8 | |
| Grants R & D | 274.2 | |
| Sub Total | <u>2,709.7</u> | |
| Capital Expenditures | 185.0 | |
| Administration | 235.5 | |
| Sub Total | <u>420.5</u> | |
| Total R & D | | <u>3,130.2</u> |

Testing

| | | |
|----------------------|----------------|----------------|
| In House Testing | 3,861.0 | |
| Capital Expenditures | 418.0 | |
| Total Testing | <u>4,279.0</u> | <u>4,279.0</u> |

Related Scientific Activity

| | | |
|-----------------------------------|----------------|----------------|
| Scientific Information | 107.4 | |
| Scholarship Program | 25.8 | |
| Data Collection | 1,198.6 | |
| Total Related Scientific Activity | <u>1,331.8</u> | <u>1,331.8</u> |

Total Expenditures 8,741.0

Federal Contribution to Jointly
Funded Programs 614.5

MINISTRY EXPENDITURES 8,126.5

Joint Funding Provided Under: I.J.C. International Joint Commission
C.O.A. Canada-Ontario Agreement on Great
Lakes Water Quality.

November 8, 1976

TABLE B

Level of Training of Scientific and Professional
R&D Staff (Complement Only) (In-House Projects)

| | <u>1973-74</u> | <u>1974-75</u> | <u>1975-76</u> |
|-----------|----------------|----------------|----------------|
| No degree | | 7 | 8 |
| Bachelors | | 22 | 23 |
| Masters | | 17 | 22 |
| Doctorate | | 14 | 19 |

Level of Training of Scientific and Professional
Testing Staff (Complement Only) (In-House Projects)

| | <u>1973-74</u> | <u>1974-75</u> | <u>1975-76</u> |
|-----------|----------------|----------------|----------------|
| No Degree | | 2 | 1 |
| Bachelors | | 31 | 30 |
| Masters | | 9 | 9 |
| Doctorate | | 9 | 11 |

Scientific and Professional Staff Involved in Research
Administration

| | <u>1973-74</u> | <u>1974-75</u> | <u>1975-76</u> |
|-----------|----------------|----------------|----------------|
| No Degree | | 2 | 2 |
| Bachelors | | 3 | 3 |
| Masters | | 4 | 5 |
| Doctorate | | 5 | 5 |

APPENDIX A

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IN HOUSE RESEARCH

| | Page |
|----------------------------------|------|
| Water Resources Branch | 1 |
| Pollution Control Branch | 2 |
| Laboratory Services Branch | 3 |
| Air Resources Branch | 4 |

WATER RESOURCES BRANCH

The Branch is responsible for surface and ground water quality and quantity. The research objectives are:

To develop specialized techniques for restoration, enhancement and assessment of water quality and to determine water quality effects on the natural environment.

To develop mathematical models to represent biological, chemical and physical process changes in water.

| | |
|---------------------------------|-----------|
| In House Research Expenditures: | 1975/76 |
| | \$781,000 |

The Branch has no special research group and most of the professional and scientific staff carry out research along with their other duties.

Professional and Scientific Staff Active in Research in 1975/76

| Qualifications | Age | Years Service | Man Years |
|----------------|-----|------------------|---------------|
| Ph.D. | 35 | 4 | 1 |
| Ph.D. | 39 | 9 | $\frac{1}{2}$ |
| M.Sc. | 39 | 7 | 1 |
| M.Sc. | 29 | 2 | $\frac{1}{4}$ |
| B.Sc. | 26 | 3 | 1 |
| B.Sc. | 31 | 2 | 1 |
| M.Sc. | 25 | 2 | 1 |
| M.Sc. | 36 | 3 | $\frac{1}{2}$ |
| B.Sc. | | 2 | $\frac{1}{2}$ |
| Ph.D. | | 2 | $\frac{1}{4}$ |
| Ph.D. | 37 | 9 | 1 |
| B.Sc. | 39 | 9 | 1 |
| B.Sc. | 29 | 5 | $\frac{1}{4}$ |
| M.Sc. | 31 | 4 | $\frac{1}{4}$ |
| M.Sc. | 38 | 8 | $\frac{1}{2}$ |
| M.Sc. | 25 | 2 | 1 |
| Ph.D. | 40 | 2 | $\frac{1}{4}$ |
| B.A. | 26 | 3 | $\frac{1}{4}$ |
| M.Sc. | 37 | 5 | $\frac{1}{2}$ |
| M.Sc. | 30 | 3 | $\frac{1}{4}$ |

POLLUTION CONTROL BRANCH

Research Objectives:

To advance the quality of water supply and treatment, sewerage and sewage treatment, water and soil resource use.

To establish criteria for the application of the Model Noise By Law

Budget:

In House Research

1975/76

\$ 853, 700

The following staff of the Branch are involved in the research programme to varying degrees but average 56% of their time on the Branch research programme.

| Qualifications | Age | Years Service |
|----------------|-----|---------------|
| Ph.D. | 41 | 6 |
| Ph.D. | 37 | 4 |
| M.Sc. | 61 | 12 |
| B.Sc. | 29 | 6 |
| MA.Sc. | 42 | 16 |
| Ph.D. | 34 | 3 |
| B.Sc. | 45 | 4 |
| B.Sc. | 34 | 4 |
| Senior) | | |
| Cambridge) | 61 | 4 |
| Certificate) | | |
| B.Sc. | 39 | 4 |
| M.Sc. | 34 | 4 |
| B.A. | 33 | 4 |
| B.Sc. | 47 | 4 |
| Ph.D. | 36 | 4 |
| M.Sc. | 39 | 4 |
| B.Sc. | 43 | 5 |
| B.Sc. | 28 | 3 |
| B.Sc. | 50 | 6 |
| No degree | 37 | 6 |
| No degree | 28 | 6 |
| M.Sc. | 35 | 11 |
| M.Sc. | 33 | 10 |
| B.Sc. | 36 | 4 |
| B.Sc. | 28 | 6 |
| No degree | 40 | 15 |

LABORATORY SERVICES BRANCH

Scientists who are involved in
research and development work.

The primary responsibility of the professional and scientific staff of this branch is to perform analytical work as required by Ministry programs and to provide expert advice in evaluation and interpretation of analytical data as well as participating in planning and implementation of new programs. The nature of this work requires a varying degree of research and development which is carried out by the same scientists, using the same staff and facilities as in their analytical support work, dependent on the recognized needs, priorities and the available capacity. This work is carried out in an organized manner in form of a series of projects, approved, supervised and administered according to a well defined system.

Below are listed those scientists of each section who are in charge of scientific projects or are supervising such projects:

| QUALIFICATIONS | AGE | YEARS SERVICE |
|----------------|-----|------------------|
| M.Sc. | 47 | 2 |
| Ph.D. | 36 | 3 |
| Ph.D. | 31 | 2 |
| Ph.D. | 28 | 2 |
| B.Sc. | 51 | 25 |
| B.Sc. | 34 | 9 |
| B.Sc. | 33 | 10 |
| M.Sc. | 49 | 5 |
| Ph.D. | 36 | 3 |
| Ph.D. | 32 | 3 |
| Ph.D. | 42 | 3 |
| Ph.D. | 44 | 2 |
| M.Sc. | 35 | 9 |

Budget:

In House Research

\$260,000

AIR RESOURCES BRANCH

In House Research

The Phytotoxicology Section carries out research on the effects of airborne pollutants on vegetation and soils and provides research and data in support of air quality criteria.

Research Budget: 1975/76
\$ 25,000

The projects are carried out by all professional and scientific staff on a part time basis with a total of 2 man years.

| Qualifications | Staff Age | Years Service |
|----------------|--------------|------------------|
| 3 Ph.D. | | 4 |
| 3 M.Sc. | | 4 |
| 4 B.Sc. | | 5 |

APPENDIX B

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CONTRACT RESEARCH

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|---|------|
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| Water Resources Branch Contracts | 2 |
| Air Resources Branch Contracts | 6 |
| Resource Recovery Branch Contracts | 8 |
| Pesticides Advisory Committee Contracts 1975/76 | 9 |
| Waste Management Advisory Committee Contracts | 13 |

CONTRACT RESEARCH

Summary

| | 1975/76 |
|-------------------------------------|-----------------------|
| | Contract Expenditures |
| Pollution Control Branch | 5.0 |
| Water Resources Branch | 87.8 |
| Air Resources Branch | 150.0 |
| Resource Recovery Branch | 44.0 |
| Pesticides Advisory Committee | 136.0 |
| Waste Management Advisory Committee | <u>93.0</u> |
| Totals | 515.8 |

WATER RESOURCES BRANCH

Contracts

PROJECT TITLE: The Effect of Depressed pH on Brook Trout and Flagfish Reproduction, Growth and Survival.

CONTRACTOR: Dr. G.W. Ozburn, Lakehead University.

OBJECTIVE: To determine what levels of depressed pH impair or inhibit Brook Trout reproduction, growth and survival under soft water conditions and correlates those changes with that of Flagfish which are being used as a test species in the Ministry of the Environment Toxicity laboratories.

RELATIONSHIP TO MINISTRY OBJECTIVES: This work supports our objective of establishing a fishery in low pH lakes in the Sudbury area. The flagfish is an ideal test organism to assess the condition of a lake and this correlation will therefore allow an estimate of effects of any given lake on a trout population.

REMARKS: The project was not tendered.

COST: \$39,000

PROJECT TITLE: Histological Examination of the Gonads.

CONTRACTOR: Dr. S.M.Ruby - Sir George Williams University

OBJECTIVE: To establish a short-term method of evaluating the reproductive capacity of fisheries based on histological indices.

RELATIONSHIP TO
MINISTRY OBJECTIVES: This work tries to determine a direct cause and effect relationship between low pH and failure of fish to thrive. This is needed to help in managing fisheries in low pH water.

BUDGET: \$6,300

REMARKS: The project was tendered.

PROJECT TITLE: Utilization of Aquatic Plants

CONTRACTOR: Limnos Limited - J.H. Neil

OBJECTIVE: To find uses for aquatic plants as animal feed and compost. All work is being done at the University of Guelph.

RELATIONSHIP TO
MINISTRY OBJECTIVES: Aquatic plants are prepared for feeding trials with sheep and chickens. Extensive analysis of the plants are carried out and the conversion rate is determined for the test animals. Compost is prepared and some plants are grown in it to test nutritive value and ultimate economic value. These two uses may be very economic so that weed harvesting costs will be reduced and a valuable resource may come from a problem. The Ministry would have a solution to a problem which would be of little or no cost to the lake users.

BUDGET: \$29,500

REMARKS: The project was not tendered.

PROJECT TITLE: Aquatic Plant Drying Methods.

CONTRACTOR: Dr. J. Pos - University of Guelph.

OBJECTIVE: To develop cheaper methods of drying aquatic plants in preparation for use as animal feed or compost. Work is being done at the University of Guelph.

RELATIONSHIP TO
MINISTRY OBJECTIVES: In order to make aquatic weed harvesting an economic management technique, some use should be found for the plants. They are too wet for most uses and do not dry well in the sun. Mechanical methods are needed so the weed "problem" can be turned into a resource.

BUDGET: \$13,000

REMARKS: The project was not tendered.

AIR RESOURCES BRANCH

Contract Research

Title: Sudbury Environmental Study

Contractors:

Professor A.I. Carswell
Dept. of Physics
York University

The MEP Company
Environmental Research and Engineering
73 Alness Street
Downsview, Ontario

Ontario Research Foundation
Sheridan Research Park
Mississauga, Ontario

Professor J.L. Sullivan
Director, Environmental Engineering Programme
University of Western Ontario
London, Ontario

Professor J.R. Kramer
Dept. of Geology
McMaster University

Dr. E. Beauchamp
Dept. of Land Resource Science
University of Guelph

Objective:

To document the composition and fate of atmospheric emissions from the smelting operations in the vicinity of Sudbury; to establish in a definitive manner the relationships between these emissions and their effects on the environment in order that the required measures can be implemented as soon as possible to correct past and prevent further environmental degradation in the Sudbury area.

Project Cost:

75-76 = \$150,000

The Sudbury Environmental Study is on-going and reports on the previous work are in preparation.

RESOURCE RECOVERY BRANCH

Contracts

Contractor: ORF

Objective: To establish product utilization and market potential
of recovered resources (2 contracts in progress)

Relationship of Objectives to Branch Objectives:

Recovery of waste components as marketable commodities
will reduce material flow to landfill

Cost Total: \$44,000

Awarding of Contracts:

One contract put out to tender - \$27,000
second contract not put out for tender - \$17,000
suggested research by ORF

ONTARIO PESTICIDES ADVISORY COMMITTEE

Inventory of Scientific Activities
1975/76

Following two years of productive research supervised by the Pesticides Advisory Committee the sum of \$150,000 was allocated to sponsor pesticide research in 1975-76.

The "Call for Grant Requests (Appendix 1)" was sent out in January, 1975 to universities, industry and government, with the deadline for application being February 28, 1975. Decisions on grants to be awarded were made by June 15th, 1975.

Thirty-five grant applications were received requesting a total of \$369,479.00.

Applications were considered by the research sub-committee comprising Dr. C.D. Fowle, Dr. R. Frank, Mr. K.G. Laver, Dr. F.L. McEwen, Dr. G.R. Stephenson and Dr. C.R. Harris (chairman).

The Committee awarded 22 grants totalling \$136,017.00 based on the following objectives:

1. research leading to registration of environmentally acceptable pesticides, especially for use on minor crops (Objective 1);
2. studies on the persistence and fate of pesticides in the environment and their effects on non-target organisms (Objective 2); and
3. studies on economic thresholds of pests, on improved application techniques, and on alternative non-chemical approaches to pest control (Objective 3).

The 1975-76 Research Projects are listed in the following table:

| No. | Applicant (s) | Location | Project Title | Amount Granted |
|-----|---------------|------------------------|---|-------------------|
| 1. | Alex, J.F. | University of Guelph | Biological control of St. John's-wort | \$ 4,000. |
| 2. | Boyer, M.G. | York University | The response of bacteria, algae and invertebrates in small ponds to applications of mosquito larvicides. | 12,260. |
| 3. | Brown, J.R. | University of Toronto | Comparative study of the effect of Dursban and Abate on the growth of algae | 13,200. |
| 4. | Chiba, M. | Brock University | Simultaneous determination if intact benomyl and its degradation product, methyl benzimidazol carbamate (MBC) in plants in relation to their biological activities. | 4,200. |
| 5. | Colman, B. | York University | The effect of mosquito larvicides on algal productivity and the uptake of inorganic substrates by photoplankton. | 13,560. |
| 6. | Corke, C. | University of Guelph | Interactions of pesticides and their metabolites with microbial transformations in soil and fresh water ecosystems. | 4,040. |
| 7. | Downer, R.G. | University of Waterloo | An investigation of side effects associated with the use of insect growth regulators for mosquito control. | 2,800. |
| 8. | Ellis, C.R. | University of Guelph | Economic threshold of cereal leaf beetle <u>Oulema melanopus</u> (Linnaeus) on oats and barley in Ontario. | 4,500. |

APPENDIX IV. (continued)

| No. | Applicant (s) | Location | Project Title | Amount Granted |
|-----|--|----------------------------------|---|-------------------|
| 9. | Farquhar, G.J. Rover, C.A. | University of Waterloo | Study plan to monitor pesticide migration from waste disposal sites | 0. * |
| 10. | Forer, A. | York University | The effects of selected pesticides on the meiotic spindle and on chromosome movements | \$ 1,200. |
| 11. | Fushtey, S.G. | University of Guelph | Disease control in turfgrass - an integrated approach to control of <u>Helminthosporium</u> blights and <u>Sclerotinia</u> Dollar Spot. | 3,360. |
| 12. | Gillespie, T.J. Sutton, J.C. | University of Guelph | Reduction of fungicide usage on vegetable crops by scheduling sprays according to weather data. | 6,034. |
| 13. | Inculet, I.I. Kelly, C.B. | University of Western Ontario | Electrostatic application of pesticides in orchards and field crops. | 5,100. |
| 14. | Kaushik, N.K. | University of Guelph | Effects of sublethal concentrations of diazinon on stream invertebrates. | 5,554. |
| 15. | Mayfield, C. | University of Waterloo | The effects of dipyrldyl herbicides on non-target organisms. | 1,050. |
| 16. | Mayfield, C. | University of Waterloo | Herbicide residues in organic soils | 6,200. |
| 17. | McEwen, F.L. | University of Guelph | Control of the onion maggot, <u>Hylemya antiqua</u> Meigen, by use of the sterile male technique. | 23,139. |
| 18. | Ontario Fruit & Vegetable Growers Assoc. | Toronto | Biology and control of the crucifer flea beetle. | 4,800. |

APPENDIX IV. (continued)

| No. | Applicant (s) | Location | Project Title | Amount Granted |
|-------|--|---|--|-------------------|
| 19. | Ontario Fruit & Vegetable Growers Assoc. | Toronto | To test the feasibility of implementing the pest monitoring system for apple growing areas of Ontario. | \$ 4,200. |
| 20. | Smith, S., Downer, R.G. Corbet, P. and Wright, R. | University of Waterloo University of Guelph | Mosquito in Ontario | 0. ** |
| 21. | Spencer, E.Y. Chapman, R.A. | University of Western Ontario | Persistence of residues of organophosphorus insecticides in organic soils used for vegetable production in southwestern Ontario. | 6,570. |
| 22. | Spencer, E.Y. Miles, J.R.W. | University of Ontario | Insecticide residues accumulating in organic soils used for vegetable production in southwestern Ontario and movement of these residues into adjacent drainage systems. | 6,500. |
| 23. | Stephenson, G.R. | University of Guelph | Effectiveness of Bivert TDN and Nalco-Trol/Lo Drift for reducing herbicidal drift in roadside spraying. | 2,000. |
| 24. | Wilson's Laboratories | Dundas | Determination of acute toxicity of strychnine alkaloid. | 1,750. |
| Total | | | | \$ 136,017. |

* Study funded in Fall of 1974 (\$4,000.) and begun in Winter of 1974-75.

** Study funded in 1973-74 (\$15,065.) and 1974-75 (\$8,175.) with completion expected in 1976.

WASTE MANAGEMENT ADVISORY BOARD

During 1975-76, the Waste Management Advisory Board initiated the following four research studies with a total value of \$93,000. The studies are directed at problems in the packaging industry.

Wine and Spirits packaging Study by Stephenson and Kellogg Ltd., \$45,000

Float and Equity Study (soft drink bottles in circulation) by Peat Marwick & Partners - \$22,000

Beverage Container Research by M. Hare - \$23,000

Milk Packaging Study, Ontario Research Foundation - \$83,000.

APPENDIX C

AIR RESOURCES BRANCH

Grants

Title:

The Air Resources Branch Research Grants Programme

Objective:

To stimulate research into areas of direct importance and relevance for the proper management of air quality by the Ministry, and to provide the information required for rational decision-making on complex air pollution problems in Ontario.

Cost:

75-76

\$274,170

Potential Benefits:

- encourage research on various air pollution problems
- use of external expertise and facilities to obtain vital information for decision making
- contributes to education in the Province at the university level

MINISTRY OF THE ENVIRONMENT
RESEARCH AND DEVELOPMENT INVENTORY

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BRANCH Air Resources

DATE August 25, 1975

PROJECT TITLE Calibration of the Lidar for Monitoring Atmospheric
Particulates (05-75)

KEY WORDS Lidar, Atmospheric - Particulates, Particle Sampling

PRINCIPAL INVESTIGATOR D.R. Hay, Dept. of Physics,
AND AFFILIATION University of Western Ontario

LIAISON OFFICER S. Stevens, Head, Special Studies & Programme
OR SUPERVISOR Planning Unit,
Technology Development & Appraisal

| RESEARCH CATEGORY | INTERNAL GRANT | X | UNSOLICITED SOLICITED | MULTI-YEAR CONCURRENT | X |
|----------------------|-------------------|---|--------------------------|--------------------------|---|
|----------------------|-------------------|---|--------------------------|--------------------------|---|

| | | | | | |
|-----------|----|---|--|--|--|
| OBJECTIVE | 1) | To examine the sources of uncertainty in the measurement of atmospheric particulate concentration by lidar. | | | |
| | 2) | To establish the limits of uncertainty in measurements by lidar. | | | |

| | | | | | |
|-------------|----|--|--|--|--|
| DESCRIPTION | 1) | An error analysis will be carried out on the lidar equation. | | | |
| | 2) | More extensive lidar observations will be made simultaneously with direct particle sampling. | | | |

STARTING DATE June 16, 1975

COMPLETION DATE March 31, 1976

BUDGET \$10,000.00
CURRENT YEAR

MAN YEARS

| SOURCE OF FUNDS | REGULAR WORK PROGRAM | X | SPECIAL MINISTRY FUNDING | JOINTLY FUNDED PROJECT | OTHER |
|--------------------|----------------------------|---|--------------------------------|------------------------------|-------|
|--------------------|----------------------------|---|--------------------------------|------------------------------|-------|

REPORTING PROCEDURE No formal report required, except progress report in case of request for additional funding in multi-year programmes.

REMARKS Fourth year of a proposed 4-year project.

MINISTRY OF THE ENVIRONMENT
RESEARCH AND DEVELOPMENT INVENTORYBRANCH Air ResourcesDATE August 25, 1975PROJECT TITLE High Resolution Spectroscopic Studies on Daylight Atmospheric Absorption over the Toronto Region with Specific Application to the Elucidation of the Brown Atmospheric Haze (06-75).KEY WORDS Spectroscopic Studies, Atmospheric Absorption, Brown Atmospheric HazePRINCIPAL INVESTIGATOR R.W. Nicholls, CRESS,
AND AFFILIATION York UniversityLIAISON OFFICER S. Stevens, Head, Special Studies & Programme Planning Unit,
OR SUPERVISOR Technical Development & Appraisal Section

| RESEARCH CATEGORY | INTERNAL GRANT | X | UNSOLICITED SOLICITED | MULTI-YEAR CONCURRENT |
|----------------------|-------------------|---|--------------------------|--------------------------|
|----------------------|-------------------|---|--------------------------|--------------------------|

| | | | | |
|-----------|----|--|--|--|
| OBJECTIVE | 1) | To make high resolution spectroscopic observations of the absorption properties of the atmosphere. | | |
| | 2) | To elucidate the cause of the "Brown Haze". | | |

| | | | |
|-------------|----|---------------|--|
| DESCRIPTION | 1) | Experimental: | Using a 21 foot Eagle-mounted grating spectrograph-spectrometer to measure atmospheric light absorption. |
| | 2) | Theoretical: | Using "SPECT 3" a powerful computational pool, to interpret the spectroscopic observations. |

STARTING DATE June 16, 1975COMPLETION DATE March 31, 1976BUDGET \$14,550.00
CURRENT YEAR

MAN YEARS

| SOURCE OF FUNDS | REGULAR WORK PROGRAM | X | SPECIAL MINISTRY FUNDING | JOINTLY FUNDED PROJECT | OTHER |
|--------------------|----------------------------|---|--------------------------------|------------------------------|-------|
|--------------------|----------------------------|---|--------------------------------|------------------------------|-------|

REPORTING PROCEDURE No formal report required, except progress report in case of request for additional funding in multi-year programmes.

REMARKS

MINISTRY OF THE ENVIRONMENT
RESEARCH AND DEVELOPMENT INVENTORYBRANCH Air Resources DATE August 25, 1975PROJECT TITLE Demonstration of Mass Spectrometry for the Determination of Sulphur Trioxide (Sulphuric Acid) in the Presence of Sulphur Dioxide with application to Stack Gas Sampling (07-75).KEY WORDS Mass Spectrometry, Sulphur Trioxide, SO₂, Stack Gas SamplingPRINCIPAL INVESTIGATOR AND AFFILIATION P.L. Silveston,
Dept. of Chemical Engineering,
University of Waterloo.LIAISON OFFICER OR SUPERVISOR S. Stevens, Head, Special Studies & Programme Planning Unit,
Technology Development & Appraisal Section.

| RESEARCH CATEGORY | INTERNAL GRANT X | UNSOLICITED SOLICITED | MULTI-YEAR CONCURRENT |
|-------------------|------------------|-----------------------|-----------------------|
|-------------------|------------------|-----------------------|-----------------------|

| | | | |
|-----------|--|--|--|
| OBJECTIVE | 1) To demonstrate the use of Mass Spectrometry for the routine measurement of SO ₃ in the presence of SO ₂ . | | |
| | 2) To demonstrate the use of Mass Spectrometry for measuring the concentration of SO ₃ and SO ₂ in a gas sample. | | |

DESCRIPTION Demonstration of the use of mass spectrometry with SO₃/SO₂ mixtures with attention to stability, calibration, adsorption and condensation of SO₃ and corrosion.STARTING DATE June 16, 1975COMPLETION DATE March 31, 1976BUDGET CURRENT YEAR \$7,950.00

MAN YEARS

| SOURCE OF FUNDS | REGULAR WORK PROGRAM | SPECIAL MINISTRY FUNDING | JOINTLY FUNDED PROJECT | OTHER |
|-----------------|----------------------|--------------------------|------------------------|----------|
| | <u>X</u> | <u>—</u> | <u>—</u> | <u>—</u> |

REPORTING PROCEDURE No formal report required, except progress report in case of request for additional funding in multi-year programmes.

REMARKS

MINISTRY OF THE ENVIRONMENT
RESEARCH AND DEVELOPMENT INVENTORY

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BRANCH Air Resources

DATE August 25, 1975

PROJECT TITLE Detection of SO₂ and H₂S Using Laser Absorption Techniques (09-75)

KEY WORDS SO₂, H₂S, Laser Absorption, Infrared Atmospheric Monitoring.

PRINCIPAL INVESTIGATOR AND AFFILIATION E. Brannen,
Department of Physics,
University of Western Ontario.

LIAISON OFFICER OR SUPERVISOR S. Stevens, Head, Special Studies & Programme Planning Unit,
Technology, Development & Appraisal Section.

RESEARCH
CATEGORY

INTERNAL
GRANT X

UNSOLICITED
SOLICITED

MULTI-YEAR X
CONCURRENT

OBJECTIVE To develop a laser absorption system to detect SO₂ and H₂S
in the air to 0.01 ppm in less than 10 meters for monitoring
industries and the general air environment.

DESCRIPTION 1) Investigating the infrared laser systems and measuring
absorption in absorption chambers containing the gases
to be detected.
2) To design and build a working system for atmospheric
monitoring.

STARTING DATE June 16, 1975

COMPLETION DATE March 31, 1976

BUDGET CURRENT YEAR \$10,000.00

MAN YEARS

SOURCE OF
FUNDS

REGULAR
WORK X
PROGRAM

SPECIAL
MINISTRY
FUNDING

JOINTLY
FUNDED
PROJECT

OTHER

REPORTING PROCEDURE No formal report required, except progress report in case
of request for additional funding in multi-year programs.

REMARKS Continuous, 2nd year of a proposed 2-year project.

MINISTRY OF THE ENVIRONMENT
RESEARCH AND DEVELOPMENT INVENTORYBRANCH Air ResourcesDATE August 25, 1975.PROJECT TITLE Remote Lidar Detection of Pollutants (10-75)KEY WORDS Remote Lidar DetectionPRINCIPAL INVESTIGATOR
AND AFFILIATION A.I. Carswell,
Dept. of Physics,
York University.LIAISON OFFICER
OR SUPERVISOR S. Stevens, Head, Special Studies & Programme Planning
Unit,
Technology Development & Appraisal Section.RESEARCH
CATEGORYINTERNAL
GRANT XUNSOLICITED
SOLICITEDMULTI-YEAR
CONCURRENTOBJECTIVE To assess the capabilities of lidar systems for remote
measurements of atmospheric constituents.DESCRIPTION To utilize the lidar equipment to obtain a continuing
input of new atmospheric measurement data from Toronto area.STARTING
DATE June 16, 1975COMPLETION
DATE March 31, 1976BUDGET
CURRENT YEAR \$8,000.00

MAN YEARS

SOURCE OF
FUNDSREGULAR
WORK X
PROGRAMSPECIAL
MINISTRY
FUNDINGJOINTLY
FUNDED
PROJECT

OTHER

REPORTING
PROCEDURE No formal report required, except progress report in
case of request for additional funding in multi-year programmes.REMARKS Continuous, 4th year of a proposed 4-year project.

MINISTRY OF THE ENVIRONMENT
RESEARCH AND DEVELOPMENT INVENTORY

PAGE AR-14

BRANCH Air Resources

DATE August 25, 1975.

PROJECT TITLE Detection of Gaseous Pollutants Such as O₃, NO, NO₂, PAN
by direct Path Resonance Absorption Using Lasers (11-75)

KEY WORDS Detection of Gaseous Pollutants, O₃, NO, NO₂, PAN, Lasers,
Pollution Map System, Ambient Monitoring

PRINCIPAL INVESTIGATOR J. Shewchun, Dept. of Engineering, Physics,
AND AFFILIATION McMaster University.

LIAISON OFFICER S. Stevens, Head, Special Studies & Programme Planning
OR SUPERVISOR Unit,
Technology Development & Appraisal Section.

RESEARCH
CATEGORY

INTERNAL
GRANT X

UNSOLICITED
SOLICITED

MULTI-YEAR
CONCURRENT

OBJECTIVE Using Lasers to (1) produce a pollution map system
(2) as a light source in long path and
print ambient monitoring.

DESCRIPTION To investigate the detection characteristics of H₂S
with diode lasers.

STARTING June 16, 1975
DATE

COMPLETION March 31, 1976
DATE

BUDGET \$13,600.00
CURRENT YEAR

MAN YEARS

SOURCE OF
FUNDS

REGULAR
WORK X
PROGRAM

SPECIAL
MINISTRY
FUNDING

JOINTLY
FUNDED
PROJECT

OTHER

REPORTING No formal report required, except progress report in case of
PROCEDURE request for additional funding in multi-year programmes.

REMARKS

MINISTRY OF THE ENVIRONMENT
RESEARCH AND DEVELOPMENT INVENTORY

PAGE AR-15

BRANCH Air Resources

DATE August 25, 1975

PROJECT TITLE Research on the Safety and Environmental Control Aspects of Flaring (13-75)

KEY WORDS Safety, Environmental Control, Flaring, Combustion, Flame Radiation

PRINCIPAL INVESTIGATOR AND AFFILIATION T. Brzustowski, Academic Vice-President, University of Waterloo.

LIAISON OFFICER OR SUPERVISOR E.T. Barrow, Head, New Technology & Process Evaluation Unit, Technology Development & Appraisal Section.

RESEARCH
CATEGORY

INTERNAL
GRANT X

UNSOLICITED
SOLICITED

MULTI-YEAR X
CONCURRENT

OBJECTIVE To study flame for safety and environmental purpose.

DESCRIPTION
1) Study flame shape and length
2) Study completeness of combustion
3) Research on flame radiation

STARTING DATE June 16, 1975

COMPLETION DATE March 31, 1976

BUDGET CURRENT YEAR \$15,000.00

MAN YEARS

SOURCE OF FUNDS
REGULAR WORK PROGRAM X

SPECIAL MINISTRY FUNDING —

JOINTLY FUNDED PROJECT — OTHER —

REPORTING PROCEDURE No formal report required, except progress report in case of request for additional funding in multi-year programmes.

REMARKS Continuous, 3rd year of a proposed 3-year project.

MINISTRY OF THE ENVIRONMENT
RESEARCH AND DEVELOPMENT INVENTORYBRANCH Air Resources DATE August 25, 1975PROJECT TITLE Trace Analysis of Compounds on Airborne Particulate
Matter and Other Environmental Contaminants (15-75)KEY WORDS Trace Analysis, Airborne Particulate, Gas chromatograph/mass
spectrometer, aerosols.PRINCIPAL INVESTIGATOR F.W. Karasek, Dept. of Chemistry,
AND AFFILIATION University of Waterloo.LIAISON OFFICER S. Stevens, Head, Special Studies & Programme Planning
OR SUPERVISOR Unit, Technology Development & Appraisal SectionRESEARCH CATEGORY INTERNAL GRANT ☒ UNSOLICITED SOLICITED MULTI-YEAR CONCURRENTOBJECTIVE 1) To apply gas chromatograph/mass spectrometer and other
instrumentation to the trace analysis of organic compounds
adsorbed on aerosols.
2) To develop practical analytical methods.DESCRIPTION 1) Developing analytical techniques
2) Study detailed analytical work
3) Producing profile data as results.STARTING DATE June 16, 1975COMPLETION DATE March 31, 1976.BUDGET \$15,000.00
CURRENT YEAR

MAN YEARS

SOURCE OF FUNDS REGULAR WORK ☒ PROGRAM SPECIAL MINISTRY FUNDING JOINTLY FUNDED PROJECT OTHERREPORTING PROCEDURE No formal report required, except progress report in case of
request for additional funding in multi-year programmes.REMARKS Continuous, 3rd year of a 3-year project.

MINISTRY OF THE ENVIRONMENT
RESEARCH AND DEVELOPMENT INVENTORY

PAGE AR-17

BRANCH Air Resources

DATE August 25, 1975

PROJECT TITLE Atmospheric Chemical and Photochemical Reactions of
Polynuclear Aromatic Hydrocarbons (17-75)

KEY WORDS Chemical and Photochemical Reactions, Polynuclear Aromatic
Hydrocarbons, Particle Size, Cascade Impactors

PRINCIPAL INVESTIGATOR Morris Katz
AND AFFILIATION York University

LIAISON OFFICER S. Stevens, Head, Special Studies & Programme Planning
OR SUPERVISOR Unit, Technology Development & Appraisal Section

RESEARCH
CATEGORY

INTERNAL
GRANT X

UNSOLICITED
SOLICITED

MULTI-YEAR
CONCURRENT

OBJECTIVE 1) To determine the differences in distribution of polynuclear
aromatic hydrocarbons with respect to particle size in
various Ontario locations.

DESCRIPTION 1) Conducting studies of the second seasonal distribution of
PAH in relation to particle size of aerosol particle
with Andersen Cascade Impactors.

STARTING June 16, 1975
DATE

COMPLETION March 31, 1976
DATE

BUDGET \$10,000.00
CURRENT YEAR

MAN YEARS

SOURCE OF
FUNDS

REGULAR
WORK X
PROGRAM

SPECIAL
MINISTRY —
FUNDING

JOINTLY
FUNDED —
PROJECT

OTHER —

REPORTING No formal report required, except progress report in case of
PROCEDURE request for additional funding in multi-year programmes.

REMARKS

MINISTRY OF THE ENVIRONMENT
RESEARCH AND DEVELOPMENT INVENTORY

PAGE AR-18

BRANCH Air Resources

DATE August 25, 1975

PROJECT TITLE Multiple Applications of the Trace Atmospheric Gas Analyzer (TAGA) System to Air Quality Measurements.

KEY WORDS Trace Atmospheric Gas Analyzer (TAGA), Air Quality Measurements, Gas Phase, Particulates

PRINCIPAL INVESTIGATOR AND AFFILIATION J.B. French, University of Toronto

LIAISON OFFICER OR SUPERVISOR S. Stevens, Head, Special Studies & Programme Planning Unit, Technology Development & Appraisal Section.

| RESEARCH CATEGORY | INTERNAL GRANT | UNSOLICITED SOLICITED | MULTI-YEAR CONCURRENT |
|-------------------|----------------|-----------------------|-----------------------|
| | <u>X</u> | | <u>X</u> |

OBJECTIVE To develop a portable unit of the trace atmospheric gas analyzer which can monitor trace substances both in the gas phase and adsorbed on particulates.

DESCRIPTION To identify SO₂, NH₃, CH₄, HNO₃ and some other trace atmospheric constituents using TAGA.

STARTING DATE June 16, 1975

COMPLETION DATE March 31, 1976.

BUDGET CURRENT YEAR \$11,000.00

MAN YEARS

| SOURCE OF FUNDS | REGULAR WORK PROGRAM | SPECIAL MINISTRY FUNDING | JOINTLY FUNDED PROJECT | OTHER |
|-----------------|----------------------|--------------------------|------------------------|---------------|
| | <u>X</u> | <u> </u> | <u> </u> | <u> </u> |

REPORTING PROCEDURE No formal report required, except progress report in case of request for additional funding in multi-year programmes.

REMARKS 1st year of a 2-year project.

MINISTRY OF THE ENVIRONMENT
RESEARCH AND DEVELOPMENT INVENTORY

PAGE AP-19

BRANCH Air Resources

DATE August 25, 1975

PROJECT TITLE Development of Methods of Nickel Recovery from Sulphide Ore Without Release of Sulphur Dioxide (23-75).

KEY WORDS Nickel, Sulphide Ore, Sulphur Dioxide, Literature Review.

PRINCIPAL INVESTIGATOR AND AFFILIATION C.R. Phillips, Dent. of Chemical Engineering & Applied Chemistry, University of Toronto

LIAISON OFFICER OR SUPERVISOR E.T. Barrow, Head, New Technology & Process Evaluation,, Technology Development & Appraisal Section

RESEARCH
CATEGORY

INTERNAL
GRANT ☒

UNSOLICITED
SOLICITED

MULTI-YEAR
CONCURRENT

OBJECTIVE To develop methods of extraction by nickel from sulphide ores with great reduction of SO₂

DESCRIPTION 1) Literature review
2) Will do exploratory experiment

STARTING DATE June 16, 1975

COMPLETION DATE March 31, 1976

BUDGET \$8,500.00
CURRENT YEAR

MAN YEARS

SOURCE OF
FUNDS

REGULAR
WORK ☒
PROGRAM

SPECIAL
MINISTRY
FUNDING ☐

JOINTLY
FUNDED ☐
PROJECT

OTHER ☐

REPORTING PROCEDURE No formal report required, except progress report in case of request for additional funding in multi-year programmes.

REMARKS

MINISTRY OF THE ENVIRONMENT
RESEARCH AND DEVELOPMENT INVENTORY

PAGE AP-20

BRANCH Air Resources

DATE August 25, 1975

PROJECT TITLE H_2SO_4 Aerosol Monitoring Programme (29-75)

KEY WORDS H_2SO_4 Aerosol Monitoring

PRINCIPAL INVESTIGATOR S.C. Barton, Dept. of Envl. Chemistry,
AND AFFILIATION Ontario Research Foundation.

LIAISON OFFICER S. Stevens, Head, Special Studies & Programme Planning
OR SUPERVISOR Unit, Technology Development & Appraisal Section

RESEARCH
CATEGORY

INTERNAL
GRANT X

UNSOLICITED
SOLICITED

MULTI-YEAR X
CONCURRENT

OBJECTIVE To measure ambient H_2SO_4 aerosol levels in Toronto and Sudbury area during the summer of 1975.

DESCRIPTION 1) Operation of the automated instrument in Toronto
2) Operation of the instrument in the Sudbury area.

STARTING DATE June 16, 1975

COMPLETION DATE March 31, 1976

BUDGET \$ 8,700.00
CURRENT YEAR

MAN YEARS

SOURCE OF
FUNDS

REGULAR
WORK PROGRAM X

SPECIAL
MINISTRY FUNDING

JOINTLY
FUNDED PROJECT

OTHER

REPORTING
PROCEDURE

No formal report required, except progress report in case of request for additional funding in multi-year programmes.

REMARKS

Continuous, 2nd year of a 2-year project.

MINISTRY OF THE ENVIRONMENT
RESEARCH AND DEVELOPMENT INVENTORY

BRANCH Air Resources

DATE August 25, 1975

PROJECT TITLE Reactive Hydrocarbon Monitoring Programme (30-75)

KEY WORDS Reactive Hydrocarbon Monitoring, Photochemical Studies

PRINCIPAL INVESTIGATOR
AND AFFILIATIONS.C. Barton, Dept. of Envl. Chemistry,
Ontario Research FoundationLIAISON OFFICER
OR SUPERVISORS. Stevens, Special Studies & Programme Planning Unit,
E. Singer, Head, Monitoring & Instr. Dev. Unit,
Technology Development & Appraisal Section.RESEARCH
CATEGORYINTERNAL
GRANT ☒UNSOLICITED
SOLICITEDMULTI-YEAR ☒
CONCURRENT

OBJECTIVE

The Ontario Research Foundation is to provide assistance and consultation to the Air Resources Branch on use of the reactive hydrocarbon monitors in photochemical studies in the Toronto area.

DESCRIPTION

- 1) Operation and maintenance of instruments at the 67 College St. station.
- 2) The reactive hydrocarbon data will be evaluated.
- 3) A paper, as a result, will be prepared jointly for publication.

STARTING
DATE

June 16, 1975

COMPLETION
DATE

March 31, 1976

BUDGET
CURRENT YEAR

\$10,400.00

MAN YEARS

SOURCE OF
FUNDSREGULAR
WORK ☒
PROGRAMSPECIAL
MINISTRY ☐
FUNDINGJOINTLY
FUNDED ☐
PROJECTOTHER ☐REPORTING
PROCEDURE

No formal report required, except progress report in case of request for additional funding in multi-year programmes.

REMARKS

MINISTRY OF THE ENVIRONMENT
RESEARCH AND DEVELOPMENT INVENTORY

PAGE AR-22

BRANCH Air Resources

DATE August 25, 1975

PROJECT TITLE Verification of Design Manual Procedures for Evaluation of Commercial Wet Collector Performance (32-75).

KEY WORDS Wet Collector, Particulate, Performance of Wet Scrubbers, Collection Efficiency

PRINCIPAL INVESTIGATOR AND AFFILIATION A.W. Gnyp, Dept. of Chemical Engineering, University of Windsor

LIAISON OFFICER OR SUPERVISOR E.T. Barrow, Head, New Technology & Process Evaluation, Technology Development & Appraisal Section

| | | | |
|-------------------|--|-----------------------|---|
| RESEARCH CATEGORY | INTERNAL GRANT <input checked="" type="checkbox"/> | UNSOLICITED SOLICITED | MULTI-YEAR <input checked="" type="checkbox"/> CONCURRENT |
|-------------------|--|-----------------------|---|

OBJECTIVE

- 1) To verify the application of theoretical performance equations to specific models of commercially available wet particulate collectors.
- 2) To complete the development of guidelines for evaluating the performance of wet scrubbers.

DESCRIPTION

- 1) Analysis of wet scrubbers.
- 2) Synthesis of a design equation to each specific wet collector.
- 3) Development of charts for evaluation of the particulate collection efficiency.
- 4) To improve design models.

STARTING DATE June 16, 1975

COMPLETION DATE March 31, 1976

BUDGET \$12,000.00
CURRENT YEAR

MAN YEARS

| | | | | |
|-----------------|--|---|---|--------------------------------|
| SOURCE OF FUNDS | REGULAR WORK PROGRAM <input checked="" type="checkbox"/> | SPECIAL MINISTRY FUNDING <input type="checkbox"/> | JOINTLY FUNDED PROJECT <input type="checkbox"/> | OTHER <input type="checkbox"/> |
|-----------------|--|---|---|--------------------------------|

REPORTING PROCEDURE No formal report required, except progress report in case of request for additional funding in multi-year programmes.

REMARKS Continuous, 4th year of a 4-year project.

MINISTRY OF THE ENVIRONMENT
RESEARCH AND DEVELOPMENT INVENTORYBRANCH Air ResourcesDATE August 25, 1975PROJECT TITLE The Relationship Between Ozone and "Blast" on Onions (35-75)KEY WORDS Injury Symptoms, Onions, Ozone, ControlPRINCIPAL INVESTIGATOR G. Hofstra, Environmental Biology,
AND AFFILIATION Guelph UniversityLIAISON OFFICER S. Linzon, Supervisor,
OR SUPERVISOR Phytotoxicology Section.RESEARCH
CATEGORYINTERNAL
GRANT XUNSOLICITED
SOLICITEDMULTI-YEAR X
CONCURRENT

OBJECTIVE 1) To describe the development of injury symptoms of onions in southern Ontario.
2) To correlate symptom development with ozone and weather records.
3) To utilize fungicides and antioxidants for the control of symptom development.

DESCRIPTION 1) Plots will be treated with fungicides and antioxidants.
2) Ozone levels will be monitored.
3) Lesions produced on the crop will be examined for disease-causing organisms.

STARTING DATE June 16, 1975COMPLETION DATE March 31, 1976BUDGET \$9,600.00
CURRENT YEAR

MAN YEARS

SOURCE OF
FUNDSREGULAR
WORK X
PROGRAMSPECIAL
MINISTRY
FUNDINGJOINTLY
FUNDED
PROJECT

OTHER

REPORTING PROCEDURE No formal report required, except progress report in case of request for additional funding in multi-year programmes.REMARKS Continuous 2nd year of a 2-year project.

MINISTRY OF THE ENVIRONMENT
RESEARCH AND DEVELOPMENT INVENTORYBRANCH Air ResourcesDATE August 25, 1975PROJECT TITLE Fuel Production by the Modified Combustion of Wood Bark
and other Wood-Waste Products (39-75)KEY WORDS Fuel Production, Combustion, Wood Bark, Wood-Waste ProductsPRINCIPAL INVESTIGATOR R.A. Ross, Dean, Faculty of Science,
AND AFFILIATION Lakehead University.LIAISON OFFICER E.T. Barrow, Head, New Technology & Process Evaluation,
OR SUPERVISOR Technology Development & Appraisal SectionRESEARCH
CATEGORYINTERNAL
GRANT XUNSOLICITED
SOLICITEDMULTI-YEAR X
CONCURRENTOBJECTIVE To study the influence of chemical promoters on combustion
of wood bark and other wood-waste products.

DESCRIPTION

- 1) Will investigate the influence of additives on the gasification of wood waste at $T \leq 700^{\circ}\text{C}$.
- 2) Will measure the percentage steam conversion at various steam velocities.
- 3) Will measure the rate of combustion of the chars. at various steam velocities.
- 4) Will measure the rate of combustion of the chars. at various temperatures.

STARTING
DATE June 16, 1975COMPLETION
DATE March 31, 1976BUDGET
CURRENT YEAR \$12,000.00

MAN YEARS

SOURCE OF
FUNDSREGULAR
WORK X
PROGRAMSPECIAL
MINISTRY
FUNDINGJOINTLY
FUNDED
PROJECT

OTHER

REPORTING
PROCEDURE No formal report required, except progress report in case of request
for additional funding in multi-year programmes.REMARKS Continuous, 2nd year of a 2-year project.

MINISTRY OF THE ENVIRONMENT
RESEARCH AND DEVELOPMENT INVENTORY

BRANCH Air Resources

DATE August 25, 1975

PROJECT TITLE Remote Scanning of Pollutant Gases by Raman Spectrometry
(40-75).KEY WORDS Remote Scanning, Pollutant Gases, Raman Spectrometry,
UV Lasers, Map.PRINCIPAL INVESTIGATOR R.L. Hummel & J.W. Smith,
AND AFFILIATION Dept. of Chemical Engineering & Applied Chemistry,
University of Toronto.LIAISON OFFICER S. Stevens, Head, Special Studies & Programme Planning,
OR SUPERVISOR Unit, Technology Development & Appraisal Section.RESEARCH
CATEGORYINTERNAL
GRANT ☒ XUNSOLICITED
SOLICITEDMULTI-YEAR
CONCURRENTOBJECTIVE 1) UV lasers will be used to sense and map pollutants.
2) The system will be used to provide detailed micrometeorology
over the Toronto area.DESCRIPTION A gas laser will be used as the UV source. The return
signal from pollutant gasses will pass through a Fabry-Perot
filter. Light will be separated, detected, measured and
recorded.

STARTING DATE June 16, 1975

COMPLETION DATE March 31, 1976

BUDGET \$11,000.00
CURRENT YEAR

MAN YEARS

SOURCE OF
FUNDSREGULAR
WORK ☒ X
PROGRAMSPECIAL
MINISTRY ☐
FUNDINGJOINTLY
FUNDED ☐
PROJECTOTHER ☐REPORTING No formal report required, except progress report in case of request
PROCEDURE for additional funding in multi-year programmes.

REMARKS

MINISTRY OF THE ENVIRONMENT
RESEARCH AND DEVELOPMENT INVENTORY

PAGE AP-26

BRANCH Air Resources

DATE August 25, 1975

PROJECT TITLE Initiation of an Experimental Investigation of Gas Atomized Spray Scrubbers (42-75).

KEY WORDS Gas Atomized Spray Scrubbers, Design Parameters, Venturi.

PRINCIPAL INVESTIGATOR AND AFFILIATION A.W. Gnyp, Dept. of Chemical Engineering, University of Waterloo.

LIAISON OFFICER OR SUPERVISOR E.T. Barrow, Head, New Technology & Process Evaluation, Technology Development & Appraisal Section.

RESEARCH CATEGORY

INTERNAL GRANT ☒

UNSOLICITED SOLICITED

MULTI-YEAR CONCURRENT

OBJECTIVE To develop design parameters that would optimize the performance of gas atomized spray scrubbers.

DESCRIPTION 1) Acquisition of pressure drop data for three types of commercially available venturi spray scrubbers.
2) Development of improved pressure drop models.

STARTING DATE June 16, 1975

COMPLETION DATE March 31, 1976

BUDGET \$ 15,950.00
CURRENT YEAR

MAN YEARS

SOURCE OF FUNDS

REGULAR WORK ☒ PROGRAM

SPECIAL MINISTRY FUNDING ☐

JOINTLY FUNDED PROJECT ☐

OTHER ☐

REPORTING PROCEDURE No formal report required, except progress report in case of request for additional funding in multi-year programmes.

REMARKS

MINISTRY OF THE ENVIRONMENT
RESEARCH AND DEVELOPMENT INVENTORY

PAGE AR-27

BRANCH Air Resources

DATE August 25, 1975

PROJECT TITLE A Study of Urban Haze (43-75)

KEY WORDS Urban Haze, Brown Haze, Aitken Nuclei, NO, NO₂, NO_x, SO₂, Particulate

PRINCIPAL INVESTIGATOR W.J. Megaw, CREO,
AND AFFILIATION York University

LIAISON OFFICER S. Stevens, Special Studies & Programme Planning Unit,
OR SUPERVISOR Technology Development & Appraisal Section.

RESEARCH
CATEGORY

INTERNAL
GRANT X

UNSOLICITED
SOLICITED

MULTI-YEAR
CONCURRENT

OBJECTIVE To study the structure and cause of the brown haze which forms over some large cities in the summer months.

DESCRIPTION Using the aircraft, the following parameters would be measured.

- 1) Aitken nuclei concentration
- 2) Droplet concentration and size distribution
- 3) SO₂ concentrations
- 4) NO, NO₂, NO_x concentrations
- 5) Particulate^x concentrations
- 6) Temperature, humidity and wind gradients

STARTING
DATE June 16, 1975

COMPLETION
DATE March 31, 1976

BUDGET
CURRENT YEAR \$10,000.00

MAN YEARS

SOURCE OF
FUNDS

REGULAR
WORK X
PROGRAM

SPECIAL
MINISTRY
FUNDING

JOINTLY
FUNDED
PROJECT

OTHER

REPORTING
PROCEDURE No formal report required, except progress report in case of request for additional funding in multi-year programmes.

REMARKS

MINISTRY OF THE ENVIRONMENT
RESEARCH AND DEVELOPMENT INVENTORYBRANCH Air ResourcesDATE August 25, 1975PROJECT TITLE Particulate Pollution in the Nanticoke Region (48-75)KEY WORDS Particulate, Nanticoke Region, Monitoring network.PRINCIPAL INVESTIGATOR L.D. Pengelly, Dept. of Medicine,
AND AFFILIATION McMaster University.LIAISON OFFICER S. Stevens, Head, Special Studies & Programme Planning,
OR SUPERVISOR Technology Development & Appraisal Section.

| RESEARCH CATEGORY | INTERNAL GRANT | X | UNSOLICITED SOLICITED | MULTI-YEAR CONCURRENT | X |
|----------------------|-------------------|---|--------------------------|--------------------------|---|
|----------------------|-------------------|---|--------------------------|--------------------------|---|

| | | | | | | |
|-----------|----|--|--|--|--|--|
| OBJECTIVE | 1) | To study the nature of atmospheric particulates in the Hamilton-Nanticoke Region. | | | | |
| | 2) | To establish scientific basis for planning and development and a permanent particulate monitoring network. | | | | |

| | | | | | |
|-------------|---|-------------------------------------|--|--|--|
| DESCRIPTION | The following parameters would be determined: | | | | |
| | 1) | Particle size distribution | | | |
| | 2) | Aerosol total loading distributions | | | |
| | 3) | Elevation effects | | | |
| | 4) | Wind Direction effects | | | |
| | 5) | Chemical Composition | | | |

STARTING
DATE June 16, 1975COMPLETION
DATE March 31, 1975BUDGET
CURRENT YEAR \$15,000.00

MAN YEARS

| | | | | | | | | |
|--------------------|----------------------------|---|--------------------------------|---|------------------------------|---|-------|---|
| SOURCE OF FUNDS | REGULAR WORK PROGRAM | X | SPECIAL MINISTRY FUNDING | — | JOINTLY FUNDED PROJECT | — | OTHER | — |
|--------------------|----------------------------|---|--------------------------------|---|------------------------------|---|-------|---|

REPORTING
PROCEDURE No formal report required, except progress report in case of request for additional funding in multi-year programmes.REMARKS New multi-year project

MINISTRY OF THE ENVIRONMENT
RESEARCH AND DEVELOPMENT INVENTORYBRANCH Air ResourcesDATE August 25, 1975PROJECT TITLE Fate of Sulfur Dioxide and Related Materials Scavenged
by Rain and SnowKEY WORDS Precipitation, deposition, simulationPRINCIPAL INVESTIGATOR AND AFFILIATION J.R. Kramer, Dept. of Geology,
McMaster University.LIAISON OFFICER OR SUPERVISOR S. Stevens, Special Studies & Program Planning Unit,
Technology Development & Appraisal Section.RESEARCH
CATEGORYINTERNAL
GRANT XUNSOLICITED
SOLICITEDMULTI-YEAR X
CONCURRENT

OBJECTIVE

See next page.

DESCRIPTION

See next page.STARTING DATE June 16, 1975COMPLETION DATE March 31, 1976.BUDGET CURRENT YEAR \$39,420.00

MAN YEARS

SOURCE OF
FUNDSREGULAR
WORK PROGRAM XSPECIAL
MINISTRY FUNDING JOINTLY
FUNDED PROJECT OTHER REPORTING PROCEDURE No formal report required, except progress report in case of request
for additional funding in multi-year programmes.REMARKS This is the 4th of a four-year project.

PROJECT TITLE Fate of Sulfur Dioxide and Related Materials Scavenged
by Rain and Snow.

OBJECTIVE To carry out monthly analysis of precipitation collected
in the Sudbury area deposition and precipitation network
as well as event experiments so that the fate of emitted
pollution can be simulated.

DESCRIPTION 1) To continue to analyse on a monthly basis the 30⁺ monthly
samplers. To add a few new stations to the network.
2) To increase the number of monthly samplers in the Timmins
area in order to assess specific loading pertinent to
the region.
3) To sample event and wet only precipitation and to sample
associated ambient air concentrations.
4) To provide sampling and analytical facilities for four
study lakes in the Sudbury programme.
5) To carry out a series of experiments using flow-through
electrodes to analyse very short changes in precipitation
concentrations in order to obtain scavenging coefficients.
6) To modify the BOX model for atmospheric oxidation of SO₂
to consider pH as a variable and to input differing
fall velocities as determined from field size
analysis. To run the BOX model for the Sudbury
region for 2-3 years of daily meteorological data
using the monthly stations as receptors.
7) To modify the EPAEC model by integrating over a
series of plume conditions (daily); to modify
the oxidation coefficients to apply to the Sudbury
situation; to obtain event data with hourly meteo-
rological data in order to evaluate precipitation
event predictions to compare with field data.
8) To develop the "best fit" prediction model for load-
ings in Northern Ontario for a given emission from
the Sudbury smelter.



RESEARCH AND DEVELOPMENT INVENTORY

BRANCH:

Air Resources Branch

DATE:

PROJECT TITLE:

Current Literature Review (26-75)

KEY WORDS:

PRINCIPLE INVESTIGATOR
AND AFFILIATION

Dr. S. C. Barton, Dept. of Environmental Chemistry,
Ontario Research Foundation

LIAISON OFFICER
OR SUPERVISOR

Dr. S. Stevens, Head, Special Studies and Program Planning Unit,
Air Resources Branch

RESEARCH
CATEGORY:

INTERNAL
GRANT X

UNSOLICITED CONTRACT MULTI-YEAR PROJECT
SOLICITED CONTRACT CONCURRENT PROJECT

OBJECTIVE:

To provide a back-up current awareness service to
the Air Resources Branch.

DESCRIPTION:

- 1) An annotated bibliography of relevant articles will
be submitted quarterly.
- 2) Will provide verbal reports on items of immediate
interest.

DURATION
OF PROJECT

 1 YEARS

PRESENT
YEAR IS

 1 YEAR

REPORTING
DATE

BUDGET:

TOTAL DOLLARS
TOTAL PROJECT CURRENT YEAR
4,000

MAN YEARS
TOTAL PROJECT CURRENT YEAR

SOURCE OF
FUNDS:

REGULAR
WORK X
PROGRAM

SPECIAL
MINISTRY
FUNDING

JOINTLY
FUNDED OTHER
PROJECT

IS A REPORT ANTICIPATED?

Yes

PARTICIPATION BY OTHER MINISTRIES:

None

REMARKS:



RESEARCH AND DEVELOPMENT INVENTORY

Ontario

BRANCH:

Air Resources Branch

DATE:

PROJECT TITLE:

Support of General Research Activities (46-75)

KEY WORDS:

PRINCIPLE INVESTIGATOR
AND AFFILIATION

Dr. J. B. Hyne, Alberta Sulphur Research Ltd.

LIAISON OFFICER
OR SUPERVISOR

Dr. Frank Frantisak, Supervisor,
Technology Development & Appraisal Section

RESEARCH
CATEGORY:

INTERNAL
GRANT X

UNSOLICITED CONTRACT MULTI-YEAR PROJECT
SOLICITED CONTRACT CONCURRENT PROJECT

OBJECTIVE:

To support general research activities of Alberta Sulphur
Research Ltd.

DESCRIPTION:

Research on Sulphur and other related studies.

DURATION
OF PROJECT

 1 YEARS

PRESENT
YEAR IS

 1 YEAR

REPORTING
DATE

BUDGET:

TOTAL DOLLARS
TOTAL PROJECT CURRENT YEAR
2,500

MAN YEARS
TOTAL PROJECT CURRENT YEAR

SOURCE OF
FUNDS:

REGULAR X
WORK PROGRAM

SPECIAL
MINISTRY
FUNDING

JOINTLY
FUNDED OTHER
PROJECT

IS A REPORT ANTICIPATED?

Yes

PARTICIPATION BY OTHER MINISTRIES:

None

REMARKS:

TD
178.7
057
158
1976

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100